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Division of Environ

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PREFACE

This inventory covers environmental control relatec
during Fiscal Year (FY) 1977 by the Energy Research and De
tion (ERDA). For clarity, no attempt has been made within
to translate ERDA organizational terminology to that of the
(DOE). The FY 1978 edition will survey all the DOE energy

PREFACE

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B. Fossil Energy

C. Nuclear Energy

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Distribution of Total ERDA Environmental Control Activitie Related to FY 1977 Funding by Energy Category

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Distribution of Environmental Control Technology Funding in the Office of the Assistant Administrator for Fossil Energ

Distribution of Environmental Control Technology Funding in the Coal Program within the Office of the Assistant Administrator for Fossil Energy

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Distribution of Environmental Control Technology Funding in the Office of the Assistant Administrator for Solar, Geothermal, and Advanced Energy Systems

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Projects with Environmental Control Aspects; Fossil Energy; Coal; Demonstration Plants

Projects with Environmental Control Aspects; Fossil Energy; Coal; Magnetohydrodynamics

Projects with Environmental Control Aspects; Fossil Energy; Petroleum and Natural Gas; Enhanced Oil Recovery

Projects with Environmental Control Aspects; Fossil Energy; Petroleum and Natural Gas; Enhanced Gas Recovery

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protect and enhance the general health, safety, and welfare of
ires that environmental effects be considered and mitigating r
all energy processes through incorporation of environmental
which are developed as an integral part of energy system design

Division of Environmental Control Technology (ECT) within th
tant Secretary for Environment (ASEV) is responsible for ensuri
and independent assessment, the timely development o
ntal control technology capability with DOE's energy techno
. The projects directly under the cognizance of ECT ar
ent overview and assessments designed to provide this assur
the Research and Development (R&D) requirements for env
The energy technology offices have the direct responsibility
) of environmental controls in conjunction and in phase
e energy technology RD&D programs to assure environment
he energy technology at commercialization.

s inventory of environmental control technology activities was
nistrator, ERDA, prior to the incorporation of that administra
artment of Energy. This compilation of total Energy Re
ent Administration (ERDA) environmental control technology
ciated funding, related to environmental control technology id
committed by ERDA to demonstrate its objective to protect a
al health, safety, and welfare of the nation in the Research, De
onstration of energy systems. Again, it should be stressed that
development, and demonstration activities are covered in
ilation for FY 1978 will encompass all of the DOE activities.

provides visibility into the total DOE environmental control
councils of government, other agencies, and the private sec
distinguish explicitly actual DOE efforts in this area so as to
establishment of future needs and requirements. This report w
reference source to be used for future environmental control
DOE and to serve as a reference base from which related acti
DOE may be evaluated and compared.

As the first in a series of annual reports on environmenta
activities within the DOE, this report will serve as a basis for
in the development of environmental controls. As a baseline d
will provide the background material required to evalua
environmental control accomplishments, issues, gaps, and over
energy development within the DOE, in conjunction with other
private sector.

to environmental control technology.

The distribution by energy technology category is d
The coal program was almost half (48 percent) of the tot
with 38 percent, of which 30 percent was related t
production, and reprocessing. Geothermal comprised 5 perc
percent while the remaining categories were each 2 percen
1977 funding related to environmental control technology. T
present further details for the office of the Assist
Conservation (AC), AFE, ANE, the office of the Assistant A
Geothermal, and Advanced Energy Systems (ASGA), and the
Administrator for Environment and Safety (AES).

Table III-2 presents the funding breakdown for Cons
Figure III-3, 46 percent of the funding was in the Divis
Systems. This work is mainly directed at electric field ef
lines, research in the biological effects of high voltage ele
studies regarding transmission line effects.

Fossil Energy funding allocations are shown in Table II
Coal, Oil Shale and In-Situ Technology, and Petroleum a
associated distribution of funding, within these three pr
Figure III-4. Since the Coal program comprises the major
AFE funding associated with environmental control acti
Figure III-5 are presented to show the distribution within th
than half (62 percent) of the coal program environmental
supported by direct combustion and liquefaction program
percent is associated with gasification projects (20 percent
(7 percent), and advanced coal technology (11 percent) of t
Fossil Energy.

Nuclear Energy summary funding data is presented in
therein and in Figure III-6, the major portion of the A
environmental control activities was in the area of commer
of which 90 percent is estimated to be allocated.

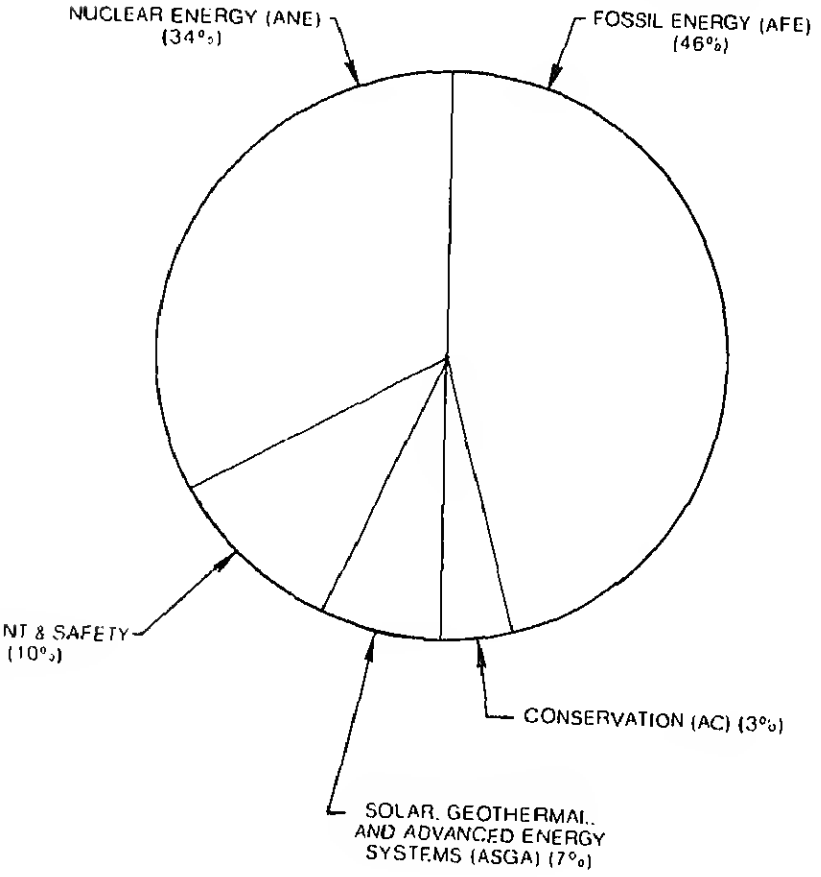
Associated funding breakdowns and corresponding dist
Geothermal, and Advanced Energy Administration (ASGA) a
6 and Figure III-7, respectively. Geothermal energy comp
total FY 1977 funding related to environmetnal control te

n Table III-8 and depicted in Figure III-9. Within AES, nuc
s accounted for almost half (45 percent) with fossil energy rela
ting for 33 percent of the environmental control related act
ler was divided up into solar, geothermal, and advanced ene
ration, and multi-technology which included the ECT efforts in
materials transportation. The distribution of environmental co
s is shown in Figure III-9 with the management of surplus facilit
s accounting for the majority.

TOTAL DOE ENVIRONMENTAL CONTROL ACTIVITIES FUNDING ALLOC

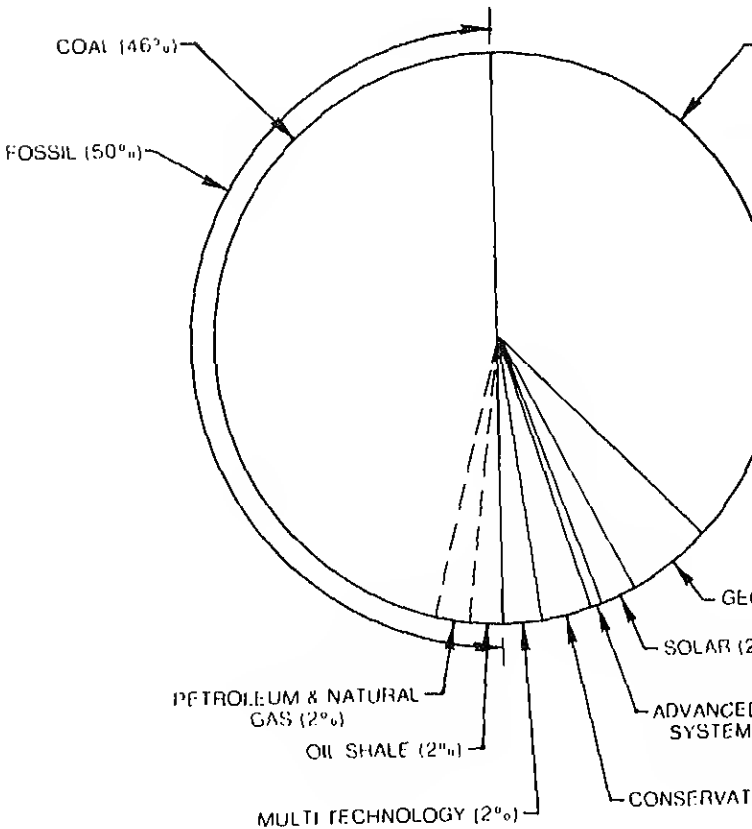
Administration**	FY 1977 Funding Allocation Related to Environmental Control Activities ($ in thousands)	Portion Budg Enviro A (
servation (AC)	5,984	
sil Energy (AFE)	86,194	
ear Energy (ANE)	62,195	
r, Geothermal, and Advanced ergy Systems (ASGA)	12,337	
ironment and Safety (AES)	17,973	

TOTAL ERDA FY 1977 FUNDING
RELATED TO ENVIRONMENTAL CONTROL: $184,883,000



-1 Distribution of Total ERDA Environmental Control Activities to FY 1977 Funding by Administration.

TOTAL ERDA FY 1977 FUNDING
RELATED TO ENVIRONMENTAL CONTROL: $184,6



ERVATION ENVIRONMENTAL CONTROL ACTIVITIES RELATED FUNDING

r Sub-Program	FY 1977 Funding Allocation Related to Environmental Control Activities ($ in thousands)	Portion of Total Budget Relat Environmental Activities (Percent)
ommunity Systems	520	1.9
Research &	813	6.4
gy Systems	2,817	13.6
e Systems	909	3.3
rgy Conservation	413	3.3
Energy	512	2.1

TOTAL CONSERVATION FY 1977 FUNDING
RELATED TO ENVIRONMENTAL CONTROL: $5,98

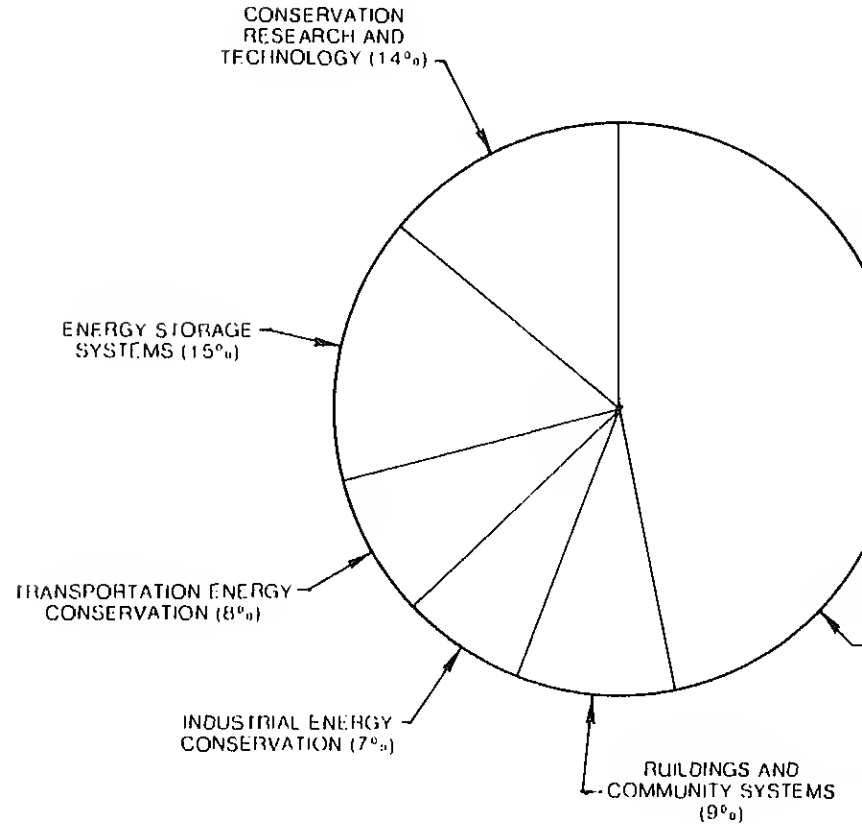
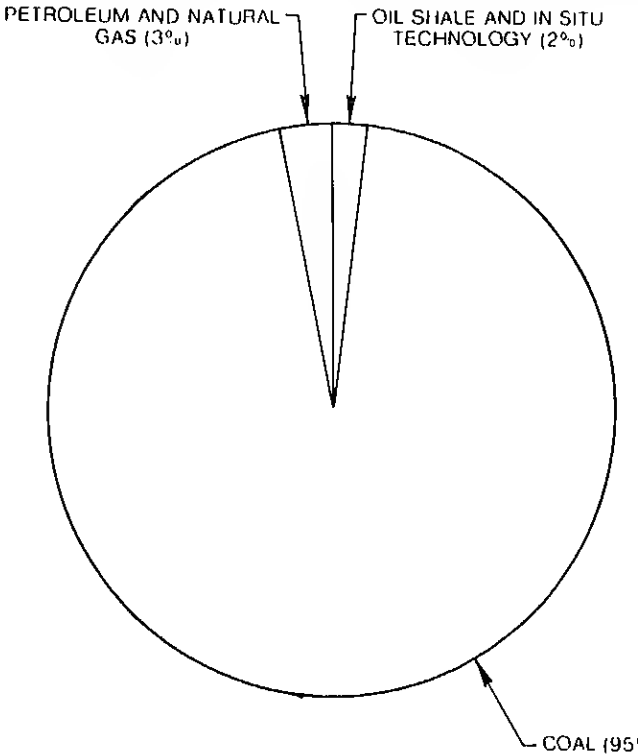


TABLE III-3

FOSSIL ENERGY
ENVIRONMENTAL CONTROL ACTIVITIES RELATED FUNDING

on or Sub-Program	FY 1977 Funding Allocation Related to Environmental Control Activities ($ in thousands)	Portion of Total FY Budget Related t Environmental Cor Activities (Percent)*
	81,897	20.0
and In Situ Technology	1,820	5.9
and Natural Gas	2,477	5.7
	86,194	17.8

TOTAL FOSSIL ENERGY FY 1977 FUNDING
RELATED TO ENVIRONMENTAL CONTROL TECHNOLOGY: $86



COAL PROGRAM
ENVIRONMENTAL CONTROL ACTIVITIES RELATED FUNDING

Coal Sub-Program	FY 1977 Funding Allocation Related Environmental Control Activities ($ in thousands)	Portion of To Budget Re Environment Activit (Perce
uefaction	29,794	40.9
h-BTU Gasification	7,781	17.1
v-BTU Gasification	8,231	24.9
anced Power Systems	1,769	7.9
ect Combustion	20,782	40.0
anced Research & Support		

TOTAL COAL PROGRAM FY 1977 F
RELATED TO ENVIRONMENTAL CONTRO

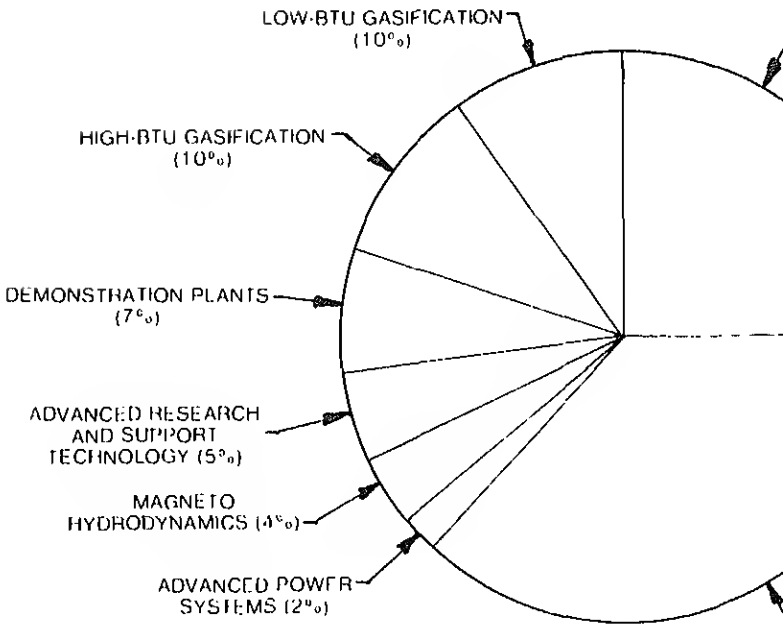


FIGURE III-5 Distribution of Environmental Control T

ENVIR NMENT L CONTROL ACTIVITI S RELATED FUNDIN

Division or Sub-Program	FY 1977 Funding Allocation Related to Environmental Control Activities ($ in thousands)	Portic Bu Envi
l Reactors	0	
ear Research and Applications	2,092	
tor Development and monstration	4,078	
ium Resources and Enrichment	0	
te Management, Production, Reprocessing	56,025	

TOTAL NUCLEAR ENERGY FY 1977 FUNDING
RELATED TO ENVIRONMENTAL CONTROL: $62,195,00

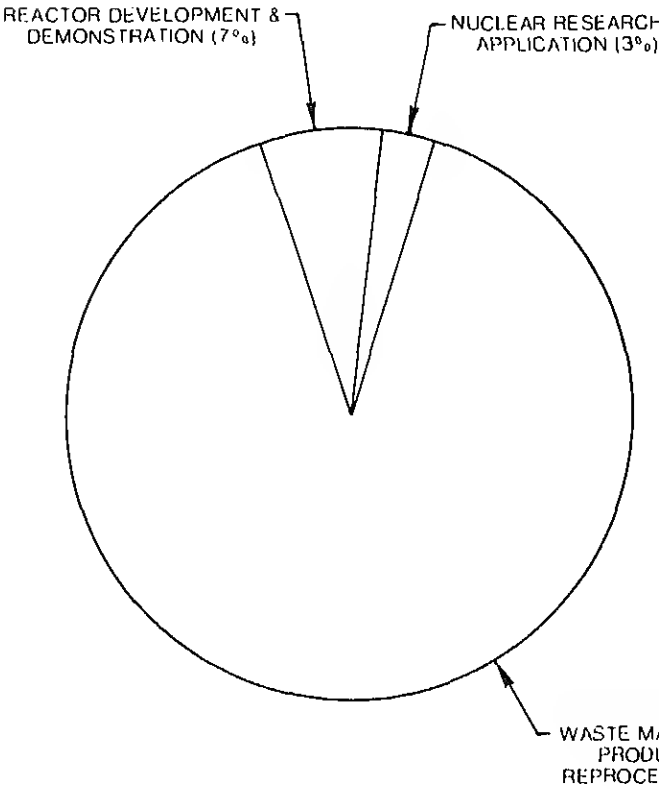
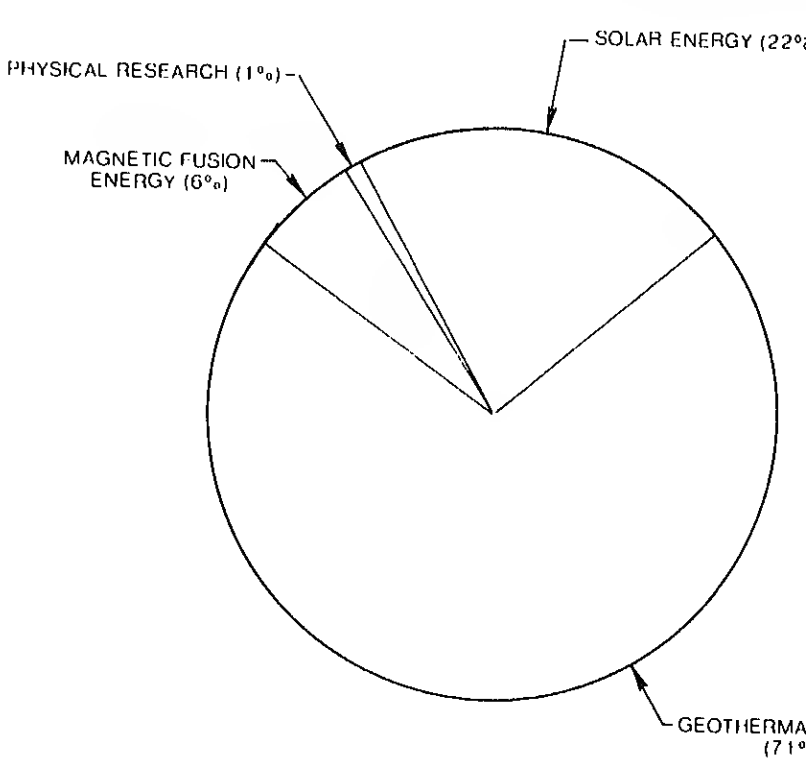


TABLE III-6

SOLAR, GEOTHERMAL, AND ADVANCED ENERGY SYSTEMS
ENVIRONMENTAL CONTROL ACTIVITIES RELATED FUNDING

Division or Sub-Program	FY 1977 Funding Allocation Related to Environmental Control Technology ($ in thousands)	Portion Buc Enviro
eothermal Energy	8,771	
lagnetic Fusion Energy	780	
hysical Research	100	
olar Energy	2,686	

TOTAL SOLAR, GEOTHERMAL, AND ADVANCED ENERGY SYSTEMS FY
RELATED TO ENVIRONMENTAL CONTROL TECHNOLOGY: $12,



IGURE I 7 D str bution of Environmental Control Technology

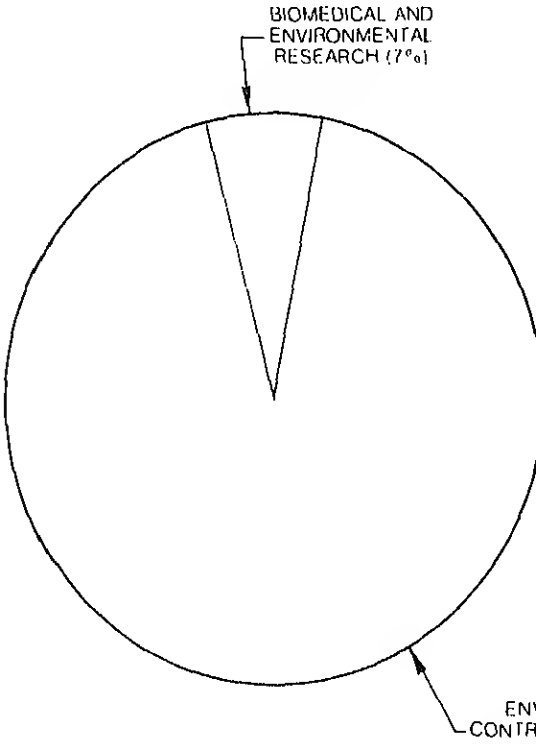
ENVIRONMENT AND SAFETY
ENVIRONMENTAL CONTROL ACTIVITIES RELATED FUNDING

Division or Sub-Program	FY 1977 Funding Allocation Related to Environmental Control Activities ($ in thousands)	Port Env
iomedical and Environmental Research	1,196	
nvironmental Control Technology	16,777	
perational Safety	0	
eactor Safety Facilities	0	

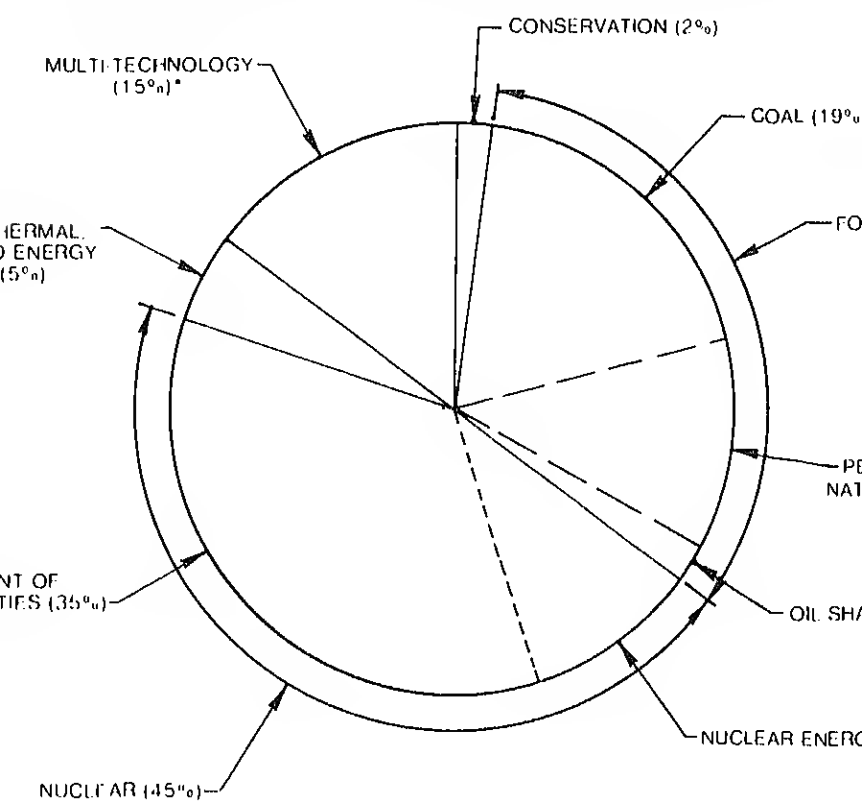
ENV ONMENT AND SAFETY
BREAKDOWN OF FY 1977 FUNDING RELATED TO
ENVIRONMENTAL CONTROL ACTIVITIES

y Category	FY 1977 Funding Allocation Related to Environmental Control Activities ($ in thousands)	Apportion FY 1977 Environme Acti (Per
	316	
y	(5,969)	
	3,551	
and Natural Gas	2,034	
	384	
logy	2,737**	
	(8,157)	
ergy	1,802	

TOTAL ENVIRONMENT AND SAFETY FY 1977 FUN
RELATED TO ENVIRONMENTAL CONTROL TECHNOLOGY:



TOTAL ENVIRONMENT AND SAFETY FY 1977 FUNDING
RELATED TO ENVIRONMENTAL CONTROL TECHNOLOGY: $17,973,000



ENERGY MATERIALS TRANSPORTATION

III-9 Distribution of Environmental Control Technology Funding

eliminate, minimize, or mitigate environmental in

Examples:

- o Add-on Process (e.g., Claus Unit for Tailgas Clea
- o Energy Process Design (e.g., Fluidized-Bed Combu
- o Energy Process "Tuning" Efforts (e.g., Reuse of W

The criteria for activity applicability to environmental in Table IV-1. It was recognized that a clear "black-and-wh was not possible across the board for all energy RD&D progr sessions was conducted to reconcile the vast majority of appl

As part of the input requirements, a standardized developed. This table, as depicted in the following sub-s following information:

a. A heading defining the administration and the ma sessions.

b. "Project/Element" Title - A descriptive title describing the principal nature of the project and was categorized as a discrete, definitely for "element" was a division of a program consis projects which are technology or subject interrela

c. A checklist to define the primary categories of t relationship to environmental control technolo studies, design, etc.

d. A description of the relationship of the pr environmental control technology. For example, filters, washers, or precipitators to remove nox lates from a combustion process.

e. Finally, the FY 1977 funding allocation related to technology. Funding was to include operating, c

TABLE IV-1

CRITERIA FOR APPLICABILITY TO ENVIRONMENTAL CONTROL TECHN

CATEGORY	APPLICABLE	N
LITIES	RD&D	ENERGY PR FACILITIES AND OFFIC
CSIGN	ENVIRONMENTAL IMPACT MITIGATION	ASSOCIATE OPERATION
ANALYSES AND	DIRECTLY OR INDIRECTLY NECESSARY TO CONTROL ENVIRONMENTAL IMPACT	DO NOT IM
TS	PARTIALLY OR DIRECTLY RELATED TO DETERMINING THE NEED FOR NEW OR ADDITIONAL ENVIRONMENTAL CONTROLS	TO EVALU OF A PROC IMPACT TH
TREAM SAMPLING SIS	EVALUATE OR DETERMINE THE EFFECTIVENESS AND	ROUTINE O

The total AC FY 1977 funding to environmental cont
$5,984,000. The Division of Electric Energy Systems project
percent of that total mainly due to three projects in the electr
power lines. The division of Energy Storage Systems (STOR)
Research and Technology (CONRT) account for 15 percent and
AC funding respectively. The STOR project with the highest fur
with conducting research into containment materials for hyd
transport. Within CONRT, there is no particular project that st
the majority of the related funding was in the area of com
technology research to improve emission controls or to decrea
The Divisions of Buildings and Community Systems (BCS),
Conservation (INDUS), and Transportation Energy Conserva
approximately equally divided in their funding levels for the rei
of the AC total. The total number of AC projects with envi
aspects was over 70 with CONRT having the most at 21 and BC
4.

The AC funding related to environmental control techno
percent of the total FY 1977 funding for AC. The objectives o
reflected in the relatively low percentage. These are: pro
conservation, conversion of existing facilities and equipment, ar
new, energy-efficient methodologies and technologies. The first
very little environmental control effort since it is directed
conservation and not energy development. The last two obj
environmental control either by providing the same energy s
energy input (less pollutants) or by the development of new tech
effectively utilize the available energy protentials. In either case
design and not as an add-on unit.

PROJECTS WITH ENVIRONMENTAL CONTROL ASPECTS

ENERGY TECHNOLOGY: Conservation

PANEL SESSION: Buildings & Community Systems

/Element Title	Check Primary Category of Environmental Control Aspects								Portion of the Project or Element Related to Environmental Control Technology
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Institutional	General	
from Waste					X			X	Reduction of solid waste and water pollution. 5%
	X				X				Recovery of waste materials. 5%
	X		X			X			Reduction of water pollution. 5%
e Digestion	X			X					Reduction of water pollution, 100%

PANEL SESSION: Conservation Research and Technology

Project/Element Title	Check Primary Category of Environmental Control Aspects								Portion of the Project or Element Related to Environmental Control Technology
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General	
P									
lization		X							Residue Disposal, 15%
ATION									
de Heat Utilization		X							Thermionic Converter Materials, 5%
rade Heat Utilization	X		X	X					Bottoming Cycle Working Fluids, 5%
de Heat Utilization		X							Reduction in Waste Heat, 5%
AMICS & HEAT TRANSFER									
s		X	X						Working Fluids, 35%
ND ANALYSIS PREPARATION									
nental Development Plan Preparation		X							Prepare Environmental Development Plan,
AND FUELS TECHNOLOGY									
combustion engine research	X								Emission Control, 100%
development of catalyzed combustion	X								Emission Control, 100%
rnace burner & industrial process heater rement	X								Improved Emission Control, 75%
burner characterization by acoustic rements	X								Decrease Emissions, 75%

ect/Element Title	Check Primary Category of Environmental Control Aspects: Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instrumental	General	Portion of the Program or Element Related to Environmental Control Technology
n studies for stratified charge	X								Emission Control, 100%
ood residue fuels	X								Reduction in Emissions, 50%
pectroscopy for application to combustors	X								Reduction in Emissions, 75%
for electrical control of fuel of liquid fuels	X								Emission Control, 100%
damental combustion parameters of	X								Reduction in Emissions, 50%
lobal kinetic mechanisms of n	X								Emission Control, 100%
ion and ignition-a new concept to diesel engine	X								Emission Control, 100%
and flammability limits: the metry via turbulence	X								Emission Control, 100%

PANEL SESSION: Electric Energy Systems

Project/Element Title	Check Primary Categories of Environmental Control Aspects: Research	Studies	Designs	Development	Sampling and Analysis	Assessment	Instructional	General	Portion of the Project or Element Related to Environmental Control Technology
on Study for Electrostatic Field Effects	X	X		X					Establish requirements for traceability, etc for electric field measurement equipment,
restigate the Biological Effects of High tric Fields	X	X			X	X			Study Biological Effects of High Strength Ele Fields on Small Animals, 100%
Line Audible Noise Measurements	X	X	X	X	X	X			Investigate audible noise generated by EHV relate to human response, 100%
f Transmission Line Support Systems	X		X	X		X			Minimize environmental impact of new supp systems, 80%
ne - Electric Field Effects of DC Lines	X			X	X	X			Investigate Field Effects of DC Lines, 100%
of the Barriers and Incentives for Using ector Distribution Cable	X	X				X			Assess environmental barriers to use of co conductor cable, 100%
	X	X		X	X	X			Study Electric Field Effects on Animals, 10
on System	X	X		X	X	X			Assess fire hazards of insulating fluids use place PCB's and other traditional fluids, 40
mine The Potential Use of Silicone Fluids ers	X	X		X	X	X			Develop alternate insulation fluids safe to p and environment, 100%

PANEL SESSION: Energy Storage Systems

Project/Element Title	Check Primary Category of Environmental Control Aspects								Portion of the Project or Element Related to Environmental Control Technology
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General	
attery Development	x	x	x			x			Examining recycling possibilities for these batteries, designing thermal insulation and fi tal safety features, and vehicle crash safety measures, 2%.
attery Development	x		x		x				Conducting all rupture tests and designing measures to prevent the rapid mixing of react well as vehicle crash safety measures, 4%.
attery Development	x		x		x				Designing and testing materials to prevent the possible leakage of chlorine and methods t recombine small quantities of hydrogen as we vehicle crash safety designs, 8%.
V Act			x						Designing high voltage D.C. electrical safety measures, 10%.
npact Assessment of Electric and Batteries		x				x			Paper study assessing the environmental problems associated with batteries used in el and hybrid vehicles, 100%
						x			This project may be funded prior to the end of FY 1977. It will assess the technical, eco political, and environmental aspects of hydro storage. This project will be partly funded w RCS, 35%

ENERGY TECHNOLOGY: Conservation

PANEL SESSION: Energy Storage Systems

ject/Element Title	Check Primary Category of Environmental Control Aspects								Portion of the Project or Element Related to Environmental Control Technology
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instrumentation	General	
rogen Production						x			Paper study assessing the toxicity of the sulfur-selenium cycle in the production of hydrogen, H2
	x	x	x	x		x			Paper study plus designing and developing safe composite flywheels for use in hybrid vehicle Determination of failure mode of composite flywhe ISS
ildings and Community System:									
Hybrid Vehicle									
ergy Storage Systems									

/Element Title	Check Primary Category of Environmental Control Research: Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instrumentation	Control	Portion of the Project Element Related to Environmental Control Technology
Control			X	X					Development and demonstration of automatic control systems for boilers. Intended to achieve complete combustion for energy efficiency and air emission reduction, 100%
			X	X					Process redesign, development, and demonstration to use unburned solvent vapors as fuel, thus improving energy efficiency and reducing emissions, 100%
rations			X	X					Process redesign, development, and demonstration to improve energy efficiency and reduce emissions, 25%.
Remelt			X	X					Development and demonstration of burner for coal firing; design for energy efficiency and reduced emissions, 25%
			X	X					Development and demonstration of furnace modifications to improve energy efficiency and to reduce emissions, 10%.
			X	X					Design, development, and demonstration of new furnace to reduce emissions and to save fuel, 75%
s			X	X					Process redesign, development and demonstration to improve energy efficiency and reduce emissions, 10%

TABLE IV-7

PROJECTS WITH ENVIRONMENTAL CONTROL ASPECTS

ENERGY TECHNOLOGY: Conservation

PANEL SESSION: Transportation Energy Conservation

ect/Element Title	Check Primary Category of Environmental Control Aspects								Portion of the Project or Element Related to Environmental Control Technology
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General	
Combustors	X	X							To Evolve and Evaluate Advanced Combustor Concept 33%
ngine		X			X				Emission Analysis as a result of Engine Mapping, 15%
		X			X				Emissions testing as part of prototype development, 1
nter	X								By going to higher temperature for external combusti engines--lower emissions, 10%
Gasoline Blends	X					X			Assessment of emissions, including unregulated, 100%
hol/Gasoline Blends						X			Assessment of emissions, including unregulated, 10%
Fuel	X								Emissions and effects, ecology, 30%
uels	X								Emissions, toxicological effects, 5%
Use Alcohol		X							Emission effects, 5%
oal Fuels		X							Interaction of emissions/regulations, 10%
ydride Storage			X						Directly impacts handling health & Safety, 100%
n Engine	X								Design influence on emissions, 10%

onmental control technology was not presented, therefore
on of the environmental control activities is not possible.
of the applicable funding was in the coal program which cor
of the total AFE funding related to environmental control activ
5 percent was associated with petroleum and natural gas (3 pe
and in-situ technology (2 percent).

thin the coal program, liquefaction accounted for 37 percent o
ated funding with solvent extraction processes ($21,150,000), f
ydrogenation processes ($6,340,000) accounting for the major
ion project activities related to environmental control technolo
on followed with 25 percent of the AFE total mainly in th
eric fluidized-bed combustion ($10,582,000) and pressurize
00). Gasification (high and low BTU) accounted for 20 percen
nding related to environmental control technology noted in th
gasification techniques and processes. The remainder (18 perc
gram environmental control activities were , in the order of fun
ed with demonstration plants ($5,795,000), advanced research a
gy ($4,301,000), magnetohydrodynamics ($3,444,000), and advar
($1,769,000).

e petroleum and natural gas program (Tables IV-16 thro
d for 3 percent ($2,477,000) of the total AFE funding
ental control technology. The environmental control activit
are almost entirely related to environmental studies and support

e oil shale and in-situ technology program, Tables IV-20
d the remaining 2 percent ($1,820,000) of the AFE funding
ental control technology. These activities are all in the c
ental support and supporting research.

PROGRAM: Coal

SUBPROGRAM: Liquefaction

	Check Applicable Environmental Control Aspects								Portion of Category Funding Related to Environmental Control Technology	FY 1977 Related to mental Tech ($ in tho
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General		
nation		X			X	X			20%	
on	X	X	X	X	X	X	X	X	56% *	21
								X	10%	
ction								X	5%	
and luations		X			X	X			17%	1

ENVIRONMENTAL CONTROL ASPECTS OF FOSSIL ENERGY PROGRAM

PROGRAM: Coal

SUBPROGRAM: High-Btu Gasification

egory	Check Applicable Environmental Control Aspects								Portion of Category Funding Related to Environmental Control Technology	FY Rela m ($
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General		
nt of Second n Gasification s								X	20%	
udies and g Evaluations		X	X		X	X			10%	

y	Check Applicable Environmental Control Aspects								Portion of Category Funding Related to Environmental Control Technology	FY 197 Related mental Tec ($ in th
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General		
ocesses			X		X				20%	
and aluations		X			X	X			50%	

SUBPROGRAM: Advanced Power Systems

	Check Applicable Environmental Control Aspects								Portion of Category Funding Related to Environmental Control Technology	FY 1977 Related to mental Tech ($ in tho
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General		
Turbine								X	5%	
rstems								X	5%	
onal Projects		X			X	X			25%	

PROGRAM: Coal

SUBPROGRAM: Direct Combusion

ategory	Check Applicable Environmental Control Aspects								Portion of Category Funding Related to Environmental Control Technology	R
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General		
l-Bed Boiler, eric*			X					X	50%	
zed Systems*			X					X	50%	
Slurries								X	5%	
tudies and ing Evaluations		X			X	X			15%	

PROGRAM: Coal

SUBPROGRAM: Advanced Research & Support Technology

gory	Check Applicable Environmental Control Aspects								Portion of Category Funding Related to Environmental Control Technology	FY Relate me ($ in
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General		
Components								X	5%	
								X	5%	
zation		X			X				10%	
velopment & n				X	X				33%	

Category	Check Applicable Environmental Control Aspects								Portion of Category Funding Related to Environmental Control Technology	F
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General		
iler Fuel Demon-lant		X				X			20%	
Synthetic Pipeline onstration Plant		X							20%	
Fuel Gas Demon-Plant		X							20%	
Fuel Gas Small Demonstration								X	20%	
nbustion Demon-lant*								X	50%	
echnical Support		X								

ENVIRONMENTAL CONTROL ASPECTS OF FOSSIL ENERGY PROGRAM

PROGRAM: Coal

SUBPROGRAM: Magnetohydrodynamics

	Check Applicable Environmental Control Aspects								Portion of Category Funding Related to Environmental Control Technology	FY 1977 Related to mental C Techn ($ in thou
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General		
ns								X	10%	$, 58
ems								X	5%	

Category	Check Applicable Environmental Control Aspects								Portion of Category Funding Related to Environmental Control Technology	R
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General		
al Studies & Support of: - Polymer Process oxide Flooding Waterflooding Recovery	X					X			25%	

ENVIRONMENTAL CONTROL ASPECTS OF FOSSIL ENERGY PROGRAM

PROGRAM: Petroleum & Natural Gas

SUBPROGRAM: Enhanced Gas Recovery

egory	Check Applicable Environmental Control Aspects								Portion of Category Funding Related to Environmental Control Technology	F Rel n ($
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General		
Studies & Support f: ydraulic Fracturing Explosive g		X				X			85%	

Petroleum & Natural Gas

SUBPROGRAM: Drilling, Exploration & Offshore Technology

ategory	Check Applicable Environmental Control Aspects								Portion of Category Funding Related to Environmental Control Technology	R ($
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General		
& Advanced ort in Drilling and	X	X						X	50%	

PROGRAM: Petroleum & Natural Gas

SUBPROGRAM: Processing & Utilization

Category	Check Applicable Environmental Control Aspects								Portion of Category Funding Related to Environmental Control Technology	R
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General		
s apply across all this subprogram. It cal to list individual								X	5%	

PROGRAM: Oil Shale & In Situ [illegible]

SUBPROGRAM: Oil Shale

Category	Check Applicable Environmental Control Aspects								Portion of Category Funding Related to Environmental Control Technology
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General	
ımental studies in il and gas production	X	X			X				100%
g Research in shale gas production		X							10%

PROGRAM: Oil Shale & In Situ Technology

SUBPROGRAM: In Situ Coal Gasification

tegory	Check Applicable Environmental Control Aspects								Portion of Category Funding Related to Environmental Control Technology	F Rel r ($
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General		
. Support in the		X			X	X			100%	
rtical Wall/ nick Seams										
d/Thick Seams										
Generator/Thin										

Reactor development and demonstration environmental control ac
ed in Table IV-23 and constituted 7 percent of the ANE total rela
3,000). The largest project, in terms of funding, was in th
ctivity control technology. Sodium processing and tritium be
l were significant activities with four separate projects. Met
., jointly funded with the National Oceanic and Atmospheric Adm
A), were also a significant environmental control activity.

Table IV-22 lists the Nuclear Research and Application environmen
ies. These comprised the remaining 3 percent ($2,092,000) of the
g related to environmental control technology. The projects fa
ries of effluent control, radioactive material handling, waste heat
on studies, environmental impact assessments, and nuclear fue
studies.

PANEL SESSION: Nuclear Research and Applications

Element Title	Check Primary Category of Environmental Control Aspect: Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General	Portion of the Project or Element Related to Environmental Control Technology
velopment of an Advanced Cool Transfer Surface	X	X		X		X			All (Effluent Control)
lower Concept	X	X		X					All (Effluent Control)
nter		X				X			All (Handling)
uation		X			X	X			All (Handling)
t Coupling and Control	X	X				X			All (Recycle)
sor Discharges	X	X				X			All (Effluent Control)
at	X	X				X			All (Recycle)
	X	X				X			All (Recycle)
tudy	X	X			X	X			All (Diffusion Studies)
's	X	X			X	X			All (Effluent Control)
sment	X	X				X			All (Environmental Impact)

PROJECTS WITH ENVIRONMENTAL CONTROL ASPECTS

ENERGY TECHNOLOGY: Nuclear Energy

PANEL SESSION: Reactor Development and Demonstration

Project/Element Title	Check Primary Category of Environmental Control Aspects: Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instrumental	General	Portion of the Project or Element Related to Environmental Control Technology
Effects of Advanced LMFBR Fuels	x	x			x	x			All
rmy Meteorological and Diffusion Data		x							All
odels for Assessment of LMFBR Radio-ses		x				x			All
in LMFBR Systems	x	x	x	x	x				All
ing and Tritium Behavior	x	x	x		x	x			All
Studies - NOAA*	x	x			x				(~80%) Diffusion Studies
gical Dose Assessment Code Improvements		x				x			All
ffluent Control Technology	x	x	x	x	x	x			(~50%) Effluent Control Technology Portion
ng and Training					x	x	x		(~4%) Environmental Control Equipment Use
onitoring	x	x	x			x	x		(~30%) Effluent Control Technology

PANEL SESSION: Reactor Development and Demonstration

Element Title	Check Primary Category of Environmental Control Aspects								Portion of the Project or Element Related to Environmental Control Technology
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instrumentation	General	
evelopment	x		x						All
			x			x			All
tem			x			x			All
cessing System			x	x		x			All
			x			x			All
vanced LMFBR Fuels	x	x			x	x			All
Systems	x	x	x	x	x				All
ium Behavior	x	x	x		x	x			All

ENERGY TECHNOLOGY: Nuclear Energy

PANEL SESSION: Waste Management, Production and Reprocessing - Commercial Waste Program

Project/Element Title	Check Primary Category of Environmental Control Aspects								Portion of the Project or Eleme Related to Environmental Control Technology
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instrumentation	General	
n/Inorganic Absorption	x			x					R&D on separation techniques for remova pollutants and heavy metals from waste
d Incineration				x					Development of fluidized bed incinerator f tion of contaminated radioactive fuel cyc
: of HLW in Metal				x					Selection of metal matrix waste form and preparation of conceptual design of plant
Hall Treatment				x					Specify criteria and identify suitable form packaging
Well Disposal	x			x					Development of concept of storing fission noble gases (solution and gas phases) in
dcination and Post Treatment Waste ation				x					Waste form development, process engine opment, equipment design verification
ncineration			x	x					Design, constructing, and operation of pr full scale combustor
te Terminal Storage Program (NWTS)	x	x	x	x					Program management, geological studies construction
Segregation of Nuclides (HLW)	x			x					R&D on methods to separate TRU and othe nuclides from HLW liquid waste
ction and Resource Recovery				x					Establishment of feasibility of reuse of co metals from a molten metal alloy
r Incineration	x			x					Testing and review of existing and prototy

Reprocessing & Commercial Waste Program

/Element Title	Check Primary Category of Environmental Control Aspects: Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instrumental	General	Portion of the Project or Element Related to Environmental Control Technology
	×			×					Development and operation of gaseous monitoring instruments
	×			×					Evaluation of options for solidification and/or fixation of C-14 and I-129
	×			×					Study feasibility of the glass and metal foil fixation process
ration Program	×	×	×	×					To demonstrate glass fixation process on HLW from reprocessing spent LWR fuel
or TRU Waste		×		×					Studies to evaluate feasibility of adapting the cyclone incinerator for processing radioactive contaminated waste
nd Development Waste te Level Waste ic Waste r Reactor									

seventy projects listed with the prime emphasis on H_2S contro
drilling technology, resource exploration and assessment
technology applications.

The environmental control activities in solar energy de
in Table IV-28 and amount to $2,686,000 or 22 percent of the
associated with environmental control technology. There we
with partial or total environmental control aspects. They co
programs within solar energy which are: heating and coo
systems; photovoltaics; and biomass, ocean, and wind systems.

The remaining 7 percent of the total ASGA funding rela
control technology was in the categories of magnetic fusion
research. The former constituted $780,000 for the majori
remainder with primary emphasis on tritium containment,
studies, and cleanup systems as denoted in Table IV-26.
activities with $100,000 in associated funding are shown in Ta
there were no separately identified projects. Some design an
efforts were associated with environmental control technolog
construction projects listed therein.

PANEL SESSION: Geothermal Energy

Project/Element Title	Check Primary Category of Environmental Control Aspects								Portion of the Project or Element Related to Environmental Control Technology
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General	
Monitoring		x	x						Environmental Data Monitoring, 15%
Signal Transmission		x	x						Environmental Data Monitoring, and Transmi 15%
ques		x	x	x	x				Determination of Scale Composition, 25%
Drilling Fluid				x					Development of Nontoxic Drilling Fluids, 15%
rument (test bed)	x	x	x						Development of Nontoxic Drilling Fluids, 25%
s		x	x	x					Environmental Data Monitoring and Transmis 10%
Brine/Mineral System	x			x				x	Model Fluid Thermodynamics, 75%
Composite Material				x					Material Development to Increase Well Safety
Polymer Well Cement	x			x					Well Material Development to Improve Integri
Inorganic Cement	x			x					Well Material Development to Improve Integri
ines	x			x	x				Determination of Corrosion Rates, 50%
Scaling	x		x	x	x				Waste Materials Control, 50%
vs Alternate Materials	x		x	x	x				Materials Corrosion Analysis, 10%
d Analysis Techniques		x	x	x	x	x			Fluid Composition Determination, 100%
nalysis	x	x	x	x	x	x			In-Situ Fluid Composition Analysis, 50%
on and Brine Management	x	x			x	x			Waste Materials Control, 75%
Evaluation		x	x	x					Well Completion Safety and Technique Evaluat

Project Element Title								
rrature Inorganic Cement	x							Well Material Development to Improve 15%
Systems - Site Specific Analysis		x	x			x		Site Specific Environmental Considerations version Systems Design, 100"
mics	x	x			x			Determination of Reservoir Rock Proper
Well Logging Device				x				Data Acquistion and Instrumentation Deve 30%
ogging Tools				x				Data Acquisition and Instrumentation Dev 10%
Refrigerator				x				Data Acquisition and Instrumentation Dev 10%
Temperature Amplifier				x				Data Acquisition and Instrumentation Dev 10%
tation	x	x						Reservoir Properties Determination, 20
tronic Components - Well Logging				x				Data Acquisition and Instrumentation De 10%
nated Reservoir Analysis	x	x			x			Analysis of Reservoir Conditions and Be
f Rocks	x	x			x			Determination of Reservoir Rock Proper
ore and Log Interpretation		x			x			Measuring of Reservoir Rock Properties
nalysis and Modeling	x	x						Modeling of Reservoir Properties and Pe

PANEL SESSION: Geothermal Energy

Project/Element Title	Check Primary Category of Environmental Control Aspects: Research	Studies	Design	Development	Sampling and Analysis	Assessment	Institutional	General	Portion of the Project or Element Related to Environmental Control Technology
Data Analysis		×							Study of Seismicity Associated with Geotherm Reservoirs, 25%
ng of Subsidence	×	×		×		×			Evaluation of Subsidence Potential 100%
ctive Model		×		×					Reservoir Model Development, 75%
ering Subcontracts (LBL)	×	×	×		×				Reservoir Properties and Performance Studi Sample Analysis Techniques, 25%
e Reservoir Assessment	×	×	×		×	×			Reservoir Properties and Performance Studi Sample Analysis Techniques, 5%
- Cerro Prieto #2		×			×				Determination and Evaluation of Subsidence,
sment		×				×			Environmental Factors - In Site Evaluation,
								×	General Program Support, 10%
e Resource Industrial Support		×			×	×			Environmental Support of High Temperature Development, 20%
e/High Salinity Test Facility Management				×				×	General Development Support, 20%
e Reservoir Engineering	×	×			×				Reservoir Properties and Performance, 5%
			×	×		×			Design and Evaluation of Environmental Cont Systems, 10%
Loop	×	×		×	×	×			Evaluation of Control Technology, 15%

Project/Element Title	Check Primary Category of Environmental Control Aspects								Portion of the Project or Eleme Related to Environmental Control Technology
	Research	Studies	Design	Developmental	Sampling and Analysis	Assessment	Instructional	General	
ımental Monitoring	x	x			x	x			Baseline Monitoring and Environmental A 10%
ontrol Program	x	x	x	x	x	x			Subsidence Research and Control Techno
Steam Scrubbing	x	x	x	x	x	x			H_2S Control Technology – Steam Scrubbi
– Oxygen Injection	x	x	x	x	x	x			H_2S Control Technology – Brine Oxidatio
Pilot Test Facility	x		x	x	x	x			H_2S Control Technology – Steam Scrubbi
t Control Analysis		x				x			Study and Assess Well Blow Out Control.
nic Studies	x	x							Study and Evaluation of Induced Seismic Related to Geothermal Development. 10
– Undesignated	x	x	x	x	x	x			H_2S Control Technology. 100%
l		x				x			Study and Assess Noise Control Technolo
uations						x	x		NEPA Environmental Reviews. 10%
ermal Loop Facility			x	x	x				Environmental Control Systems Design a mental Sampling. 15%
on-electric Applications		x				x			Environmental Studies and Assessments.
mperature Reservoir Engineering		x							Reservoir Behavior. 10%
ermal Project	x	x			x	x			Environmental Monitoring, Effects, and 20%

Project/Element Title	Check Primary Category of Environmental Control Aspects								Portion of the Project or Element Related to Environmental Control Technology
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Institutional	General	
Development and Technology									
. Tritium Systems Test Assembly				x	x				A major purpose of this facility is the d tion of tritium containment and control techn under both normal and accident conditions. Prototype Experimental Power Reactor to be in the mid 1980's. Approximately 20% of the budget is committed to containment and cont technology development.
. Alloy Development	x								Approximately 5% of this program elem FY'77 is devoted to studies of tritium perme through potential fusion reactor materials. tul development of low permeation alloys wil significantly reduce routine tritium releases fusion power plants.
. Fusion Reactor Safety Research						x			Some fusion reactor conceptual designs suggested that large quantities of activated s materials may be produced during operation plants. Approximately 6% of the FY'77 budg this program element is being applied to eva the waste management implications of fusion
echnical Projects									
. Tokamak Fusion Test Reactor				x					Tritium cleanup systems to contain rou accidental spills of tritium within facility. ment of these systems will provide design a operating experience for later magnetic fusi facilities. These represent approximately

PANEL SESSION: Physical Research

Project/Element Title	Check Primary Category of Environmental Control Aspects								Portion of the Project or Element Related to Environmental Control Technology
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instrumental	Control	
SICAL RESEARCH			x	x					The Division has underway in FY [illegible] six line items construction projects. Although some of these involves separately identifiable R&D concer environmental control technology, sanie design and minor development efforts are properly associated with environmental control in each The thrust of the work of this type is to assure fully adequate use of existing environmental control technologies. The projects underway

(1) SuperHILAC Initial Upgrading, LBL
(2) Holifield Heavy Ion Research Facility,
(3) Positron-Electron Project (PEP), SL
(4) High Flux Beam Reactor (HFBR) Pow Increase, BNL
(5) Steam Plant Modifications, ORNL
(6) Bates Linear Electron Accelerator, Experimental Area, MIT

PANEL SESSION: Solar Energy

Project/Element Title	Check Primary Category of Environmental Control Aspects								Portion of the Project or Element Related to Environmental Control Technology
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	Control	
that require additional development				X		X			Flame & toxic gas barrier to be added, 10% Double-wall approach
that require additional development				X		X			Develop double-wall approach to eliminate, 1 contamination
npact Assessment of solar heating and						X			Determine significant environmental effects.
of photovoltaic energy systems		X							Investigate environmental aspects, 5%
nductors for photovoltaic solar cells $CuInSe_2$ 1.01ev)				X	X				Measure toxicity, 5%
nductors for photovoltaic solar cells				X	X				Measure toxicity, 5%
gn and systems analysis of photovoltaic						X			Preliminary Assessment of environmental
nductors for photovoltaic solar cells method of depositing CdTe on glass)				X	X				Measure toxicity, 5%
nductors for photovoltaic solar cells				X	X				Measure toxicity, 5%
gn and systems analysis of photovoltaic tems						X			Preliminary Assessment of environmental
gn and systems analysis of photovoltaic						X			

Project/Element Title	Check Primary Category of Environmental Control Aspects								Portion of the Project or Eleme Related to Environmental Control Technology
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Institutional	General	
ıtal Impact Assessments - photovoltaic power						X			Assessment of potential environmental e
minary Technology Assessment						X			Assessment of environmental issues
mmental Analysis/Integration						X			Assessment of environmental effects
ıtal Development Plans for eight technologies						X			Identification of Environmental research ments, etc., 50%
rds Activities				X					Materials, safety, etc., standards for S
Test Procedures				X					Procedures & Standards for SHACOB To 2%
act Liquid/Liquid, Heat Exchanger				X					Develop a liquid to liquid heat exchanger studies, 50%
ota Impact Assessment for Ocean Thermal nversion(OTEC)(RFP#EG-77-R-06-1032)	X		X			X			Plan for mitigational control, 75%
ıtal Impact Assessments (EIA's) of ocean test or Ocean Thermal Energy Conversion (OTEC) 77-R-06-1035)						X			identification of control measures on OT platforms, 50%
ram Management Support			X	X				X	Physical oceanographic impact control f
	X	X	X						Physical oceanographic impact control 10

Project/Element Title	Check Primary Category of Environmental Control Aspect: Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General	Portion of the Project or Element Related to Environmental Control Technology
stion	X								Identification of products & by products req environmental analysis
r	X			X					Idenfification of products & by products req environmental analysis
ures and crop residues	X								Identification of products & by products req environmental analysis
l Gas From Residue	X								Identification of products & by products req environmental analysis
stion - 350 cattle unit	X			X					Identification of products & by products req environmental analysis
			X	X					Identification of products & by products req environmental analysis
gar and Ethanol	X								Identification of products & by products req environmental analysis
duction of organic solvents from cellulosic	X		X						Identification of products & by products req environmental analysis
Heat Tolerant Molds to Alcohol	X								Identification of products & by products req environmental analysis
lysis - Acetone - Butanol & Acetic Acid	X								Identification of products & by products req

PANEL SESSION: Solar Energy

Project/Element Title	Check Primary Category of Environmental Control Aspects								Portion of the Project or Element Related to Environmental Control Technology
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Construction	General	
xperimental Thermochemical Conversion	X		X	X					Identification of products & by products requi environmental analysis
od-to-Oil pilot plant	X			X					Identification of products & by products requi environmental analysis
s	X								Identification of products & by products requi environmental analysis
GFM Technology to other feedstocks	X		X						Identification of products & by products requi environmental analysis
on, collection, harvesting, & conversion	X		X						Identification of products & by products requi environmental analysis
omass into Gaseous Products	X		X						Identification of products & by products requi environmental analysis
	X								Identification of products & by products requi environmental analysis
ation	X								Identification of products & by products requi environmental analysis

/Element Title	Environmental Control Aspects								Portion of the Project or Element Related to Environmental Control Technology
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Institutional	General	
	X								Identification of products & by products requiring environmental analysis
	X								Identification of products & by products requiring environmental analysis
st Energy Program	X								Identification of products & by products requiring environmental analysis
al Bureau of Standards									
Thermal Energy Conversion									
tic Gas from Feedstock Material									
Heating & Cooling of Buildings									
Power System									
Energy Conversion System									
st for Proposal									

the areas supporting fossil and nuclear energy developme
lated activities comprised 33 percent and nuclear energy 45
. The remaining 22 percent was divided into multi-tech
solar and geothermal (5 percent), and conservation (2 percent).

ne fossil energy area, the majority of the applicable AES f
environmental control activities related to the productior
. The remainder was primarily related to petroleum and
with oil shale and in-situ technology development account
effort because of the limited RD&D efforts in that area,
te-of-the-art in these energy disciplines.

r, geothermal, and conservation activities were a small por
funding related to environmental control technology, primarily
ergence of these energy technologies. Principal emphasis wa
sfer materials development for solar application, on waste c
ol for geothermal energy related activities, and on urban an
trol and electric power transmission environmental impacts fo
ed efforts.

ear energy related activities were divided into two main area
he analysis of nuclear fuel cycles to assess the adequacy
ntal controls and the need for additional control requirem
of the nuclear energy associated activities were in decommis
nation efforts involved in managing surplus nuclear facilities.

energy materials transport efforts within ECT are devoted to
s including risk assessments and testing, including testing
radioactive wastes. Additionally, transportation statistics
verity of accidents, and relevant environmental transport acc
date utilizing the latest computer technology.

Project/Element Title	Check Primary Category of Environmental Control Aspects								Portion of the Project or Element Related to Environmental Control Technology
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Implementation	General	
earch	X								Bioprocess development for energy production a pollution abatement, 20%
tion of Uranium Mine & Mill Tailings S.								X	Evaluate revegetation trials, alternative rehabil measures, & recommend rehabilitation protocol
try	X								Photosynthesis & Biomass - solid waste utilizat 50%
Analysis of Proteins	X								Properties of enzymes which detoxify poisons,
Water Quality	X								Explore ways that geothermal resources could b used to improve water quality in Imperial Valley
cts of Solid Waste as a Supplemental	X								Environmental effects of co-combustion, 50%
gical Air Quality in Relation to the Ames ste Disposal System	X	X							Analysis & suggested solutions for mitigating po hazards, 20%
rol of Radioactive Air Contaminants	X				X	X			Assess, monitor & control contaminants in publ occupational environments, 50%
ironmental Conditions of the Great Lakes r Production		X							Evaluate control technology & resource manager option for mitigating adverse impacts, 25%
rol of non-nuclear Air Contaminants	X								Basic elements of control technology are evaluat effectiveness, deficiencies are remedied by imp

/Element Title	Check Primary Category of Environmental Control Aspects								Portion of the Project or Element Related to Environmental Control Technology
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General	
ch Data Base							X		Information file to assist in identifying problems in environmental control, 100%
y	X								Instrumentation designed to aid the analysis & design of pollution abatement equipment for particulates and aerosols, 100%
ecycling				X					Demonstration of natural eco-system to recycle water and nutrients, 100%

Project/Element Title	Check Primary Category of Environmental Control Aspects								Portion of the Project or Element Related to Environmental Control Technology
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Institutional	General	
ontrol Technology for Generation of l (ANL)		x				x			Comparative assessments of coal control technologies, 100%
Control Technology Survey of U.S. s (ANL)		x			x	x			Evaluate control technologies for new and expa mines, 100%
ince-Through Cooling Water Control)		x				x			Cooling water controls, 100%
rview of Environment Control Technology ns (BNL)		x				x			Emission control option, 100%
llutants from Flash-Hydro Gasifier (BNL)		x							Evaluate pollutants for control requirements,
Control Technology Aspects of In-Situ L)		x			x	x			Identify control requirements, 100%
Environmental Control Technology for Coal tewater Systems (ORNL)	x					x			Determine adequacy of existing control method identification of new control techniques, 100%
bearbon and CO Emissions Associated with Gasifiers (ORNL)					x	x			Emission control, 100%
nvironmental Control Technology for Coal Gasifiers, Excluding Largi (PNL)						x			Provide economic basis for evaluation control for commercial coal gasification systems, 100
Environmental Control Technology for									

PANEL SESSION: Environment Control Technology

Project/Element Title	Check Primary Category of Environmental Control Aspects: Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General	Portion of the Project or Element Related to Environmental Control Technology
and Test Support on the Homer-City Plant (EPA)		x			x	x			Evaluate control requirements and performance, 100%
dical and Environmental Considerations (Bolt, Beranek, and Newman)		x			x	x			Assess noise control options, 100%
gi Gasifier, Two-Stage Quench for Arthur G. McKee)		x				x			Water pollution control studies, 100%
vironmental Control Technology Heat and Water Quality (MIT)	x	x				x			Evaluate options for waste heat and water quality
ntrol Needs for Entrained Gasifier BYU)	x	x				x			Evaluate control requirements for entrained gasifier, 100%
hane Gasification Wastewaters (PERC)		x				x			Assess wastewater controls and treatment, 100%
vironmental Control Technology for J. of North Dakota)	x	x				x			Provide new term assessment of Lurgi process,
l Assessment of Coal Preparation		x				x			Assess coal preparation techniques and controls
ntrol Technology Aspects of Coal Slurry CLA)	x	x							Studies on environmental impacts of coal slurrie 100%
aracterization Removal/Recovery	x	x			x				Identify trace elements and control requirements

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oject/Element Title	Check Primary Category of Environmental Control Aspects								Portion of the Project or Element Related to Environmental Control Technology
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General	
G Storage and Transportation)		x							Evaluate environmental control needs, 100%
LNG Hazards Analysis and		x							Impact of scaling on LNG site selection, 100%
s Materials Simulated EPA)		x			x				Field test of oil spill cleanup equipment, 100%
ool (Texas A & I University)							x		Develop curriculum for oil spill training, 100%
icability of Oil Spill Treatment Island)		x				x			Assess advantages/disadvantages of treating oil spills, 100%
ds and Control of LNG G)	x					x			Identify environmental impacts, 100%
ests (NWC, China Lake)	x				x				Identify environmental impacts, 100%
carbon Sensors		x				x			Assess feasibility of three types of sensors to detect methane, 100%
ssessment (EPA)					x	x			Field test of oil spill cleanup equipment, 100%

Project/Element Title	Check Primary Category of Environmental Control Aspects								Portion of the Project or Element Related to Environmental Control Technology
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General	
Environmental Control Technology for In-Situ Oil Shale Retorting (PNL)	x	x				x			Wastewater control and management, 100%
Control Implications of Tar Sands (University of Utah)		x				x			Determine environment control implications, 100%
Control Strategy for In-Situ Oil Shale (Rich Institute)		x				x			Determine environmental control implications 100%
and Fire Hazards of Materials used for nd Cooling (SANDIA)		x				x			Evaluate environmental impacts of heat trans materials, 100%
Impacts of Energy Production using Fuels (Ames Lab)		x			x	x			Determine environment impact, 100%
ions Environment and Safety (L.L)						x			Assess environmental and safety issues, 100%
Technology Assessment (L.L.L)		x				x			Geothermal energy control assessment, 100%
ram Plan for Geothermal Liquid (PNL)		x				x			Waste disposal, 100%
H_2S Control Technology for ergy (MRI)		x				x			Pollution control evaluation, 100%
Environmental Control for High									

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Project/Element Title	Check Primary Categories of Environmental Control Aspects								Portion of the Project or Element Related to Environmental Control Technology
	Research	Studies	Development	Development	Sampling and Analysis	Assessment	Institutional	General	
aste Utilization Control Technology		x			x	x			Assess urban waste management and impact on electric power generation, 100%
of Transformer Noise Reduction ouse)		x							Noise control, 100%
ntrol Technology Requirements for h-Voltage, Overhead Transmission		x				x			Determine environmental control requirements, 100%
ar Fuel Cycles (PNL)		x				x			Adequacy of environmental controls consideratio and control improvements, 100%
an Bed Disposal--High Level NDIA)	x	x				x			Investigate methods for emplacement of HLW in submarine geologic formation of deep oceans, 1
nd Assessment of Hydrogen rt (LASL)		x				x			Assess control technology for hydrogen, 100%
Transport (PNL)		x				x			Identify potential problems, establish needs and objectives, and examine fut transportation systems, 100%
Application of Endochronic Plasticity n (ANL)		x				x			Assess control options, 100

Project/Element Title	Environmental Control Aspects								Portion of the Project or Element Related to Environmental Control Technology
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instructional	General	
on Safety Studies (PNL)		x		x	x	x			Develop methodology and perform risk assessments, 100%
ure from Malevolent Attack (SANDIA)		x			x	x			Determine attack impact and improvement measures, 100%
ical Parameters of Transportation NDIA)		x							Qualify severity of accidents, 100%
hicle Testing Program (SANDIA)	x			x	x	x			Assess validity of analyses and scale model testing, 100%
sponse of Shipping Containers Under ditions (BATTELLE)		x		x					Determine structural integrity and dynamic properties of waste containers, 100%
on Statistics Data Bank (ORNL)		x							Maintain data bank on ERDA statistics, 100%
of Transportation Accident Environmental NDIA)		x							Storage of relevant environmental accident data, 100%
port and Packaging of Radioactive IA)							x		Production of films on packaging and shipping radioactive waste, 100%
ating)-Transporting Radioactive Cargoes ssociated Universities)							x		Increase public awareness of environmental requirements, 100%
hibit Operations (NORCUS)							x		Increase public awareness of environmental requirements, 100%

Project/Element Title	Check Primary Category of Environmental Control Aspects								Portion of the Project or Element Related to Environmental Control Technology
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Instrumentation	Control	
Surveillance (ORNL)					x				Monitor radiation hazards, 100%
urveillance (ORNL)					x				Monitor radiation hazards, 100%
position of Excess Reactor .)		x							Study alternatives for making reactors indefinitely, environmentally safe. 100%
anford Retired Facility (PNL)		x		x	x	x			Planning for Hanford D&D (80%) and developme of D&D techniques (20%)
ysical, and Biologic Characterization urial Grounds (PNL)	x				x	x			Define the hazards of buried radionuclides to environment, 100%
a Surveillance (BATTELLE)					x				Radiation monitoring, 100%.
FL Shutdown Reactors (Aerojet Nuclear)					x				Radiation monitoring, 100%.
Surveillance (Atlantic Richfield)					x				Radiation monitoring, 100%
quipment Volume Reduction ld)	x		x	x					Reduction of volume of contaminated equipment a size and form suitable for terminal storage o disposal, 100%
Facility (Atomics International)					x	x		x	Removal of a potential environmental hazard,
cility (Atomics International)		x			x	x		x	Removal of a potential environmental hazard,
Surveillance-HWCTR Stand-by (Du Pont)					x				Radiation monitoring, 100%

t/Element Title	Check Primary Category of Environmental Control Aspects								Portion of the Project or Element Related to Environmental Control Technology
	Research	Studies	Design	Development	Sampling and Analysis	Assessment	Institutional	General	
mmissioning (NLO)		x			x			x	Removal of a potential environmental hazard, 100%
ra Falls Site (NLO)		x			x			x	Removal of a potential environmental hazard, 100%.
ance (REECO)					x				Radiation Monitoring, 100%
Surveillance and					x			x	Clean up and removal of radioactive wastes, 100%
ance (United Nuclear)					x				Radiation Monitoring, 100%

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ANFLOW	Anaerobic Digester Using Fluidized Bed Com
ANL	Argonne National Laboratory
ANS	Assistant Administrator for National Security
ASEV	Assistant Administrator for Environment
ASGA	Assistant Administrator for Solar, Geotherma Energy Systems
BER	Division of Biomedical and Environmental Re
BCR	Bituminous Coal Research, Incorporated
BCS	Division of Buildings and Community Systems
BNL	Brookhaven National Laboratory
B/O	Budget Outlays
BTU	British Thermal Unit
BYU	Brigham Young University
CEER	Center for Energy and Environment Research
CONRT	Division of Conservation Research and Techn
D.C.	Direct Current
D&D	Decontamination and Decommissioning
DOE	Department of Energy
ECT	Division of Environmental Control Technolog
EHV	Extra High Voltage
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EQ	Equipment
ERDA	Energy Research and Development Administr
FFTF	Fast Flux Test Facility
FPDL	Fission Power Development Laboratory
FY	Fiscal Year
GE	Division of Geothermal Energy
GC	Gulf Coast
GLGP	Geothermal Loan Guarantee Program
HFBR	High Flux Beam Reactor
HLW	High Level Waste

LBL	Lawrence Berkeley (National) Laboratory
LERC	Laramie Energy Research Center
LLL	Lawrence Livermore (National) Laborator
LMFBR	Liquid Metal Fast Breeder Reactor
LNG	Liquified Natural Gas
LPG	Liquified Petroleum Gas
LWR	Light Water Reactor
MFE	Division of Magnetic Fusion Energy
MIT	Massachusetts Institute of Technology
NBS	National Bureau of Standards
NCRR	National Center for Resource Reserve
NEC	Nuclear Energy Center
NEPA	National Environmental Policy Act
NLO	National Lead Company of Ohio
NOAA	National Oceanic and Atmospheric Admini
NR	Division of Naval Reactors
NRA	Division of Nuclear Research and Applicat
NRC	Nuclear Regulatory Commission
NRDS	Nuclear Rocket Development Station
NWC	Naval Weapons Center, China Lake
NWTS	National Waste Terminal Storage Program
OC	Office of the Controller
OP	Operating Expenses
ORNL	Oak Ridge National Laboratory
OTEC	Ocean Thermal Energy Conversion
PACE	Plant and Capital Equipment
PAD	Program Approval Document
PCB	Polychlorinated Biphenyls
PEP	Positron-Electron Project
PERC	Pittsburgh Energy Research Center
PNL	Pacific Northwest Laboratory
PRNC	Puerto Rico Nuclear Center
R	Division of Physical Research
REECO	Reynolds Electric and Engineering Compan
RDD	Division of Reactor Development and Dem

SRI	Stanford Research Institute
STOR	Division of Energy Storage Systems
TEC	Division of Transportation Energy Cons
TRU	Transuranic Waste
UCLA	University of California at Los Angeles
URE	Division of Uranium Resources and Enr
USCG	United States Coast Guard
VHTR	Very High Temperature Gas Cooled Rea
WECS	Wind Energy Conversion System
WPR	Division of Waste Management, Produc